Utilization of zinc bearing steelmaking dust and sluge

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Ferrous metallurgy is very important for our country. It creates 27 % of a gross internal product and provides 47 % of currency receipts.

The metallurgical industry consumes a broad gamma of mineral resources. The efficiency of using of these resources determines level of the cost price of metallurgical production and degree of influence on environment.

Production of ferrous metals is attended by generation of much quantity of dispersion waste products with high content of iron. These are dust and sludge, which are caught in gas cleaning systems. The iron bearing sludge of gas cleaning systems of steel-smelting furnaces is the least utilized group of solid waste and is mostly stored in catching basins and pollutes the natural systems. The problem of steel-smelting dust and sludge utilization is connected to increasing the contents of zinc and other non-ferrous metals, owing to a decreasing cast iron part and increasing zinc-coated scrap in a steelmaking. Annually 7 thousand t of zinc passes up to dust and sludge at full development of powers of steelmaking furnaces. On metallurgical mills of Ukraine the zinc bearing steel-smelting sludge is dumped in catching basins or, if there is agglomerative factory, particulate is utilized by addition to sintering charging after some preparation.

At processing of sludge with the high contents of zinc at usual sintering technology zinc practically does not delete. Charge of such agglomerate in the blast furnace will be accumulating zinc in furnace. The circulation of zinc in blast furnace conducts to serious breaches of smelting technology: skull formation and even a gap of a cover. At utilization such sludge in the building industry, in cement production conducts irretrievable losses of valuable components keeping in its. A perspective direction is the making from sludge, which has dehydrated on the traditional scheme, pellets, which will metallize, unburned pellets or briquettes. At processing of metallizated pellets from iron bearing sludge and dust is deleted 75-99 % of zinc and lead, 40-77 % of oxide of sodium and 60-85 % of oxide of potassium. The combinations of these metals, which are caught from waste gas, could be a charge for non-ferrous metallurgy.

Some industrial processes of metallization of pellets are invented. General for these processes is usage for the metallization aggregate of pellets a rotated tube-type furnace. These processes differ one from other by technology of preparation of charge, and also availability or absence of a fire grate for a heating and hardening of pellets. These processes are very material-consuming and power-consuming.

Obtained unburned pellets or briquettes can be used in a steelmelting furnaces as a substitute of scrap metal. At repeated returning of preparing sludge in steelmelting furnaces there will be an accumulation of zinc in sludge.

For processing of enriched dust or sludge at plants of non-ferrous metallurgy it is enough to have the contents 12 - 15 % of zinc. However the problem of usage of iron bearing part is not decided. Therefore it is offered to realize the recycling of dust or sludge to content of zinc 12-15 %, further to make processing of sludge with humidity 6-8 % by fluid steelmelting slag. Thus we will receive the products of zinc sublimation, which are charge for non-ferrous metallurgy and slag iron enriched and it can be used in charge for blast furnace. At usage of such lumpy product in the blast furnace will economize agglomerate, limestone, the manganese ore, and coke. Thus at usage of one ton of such product will be economize more than 60$.

Thus for a solution of a problem of utilization of zinc bearing dust and sludge there is a potential in steelmaking production. Offered technology will permit to utilize all valuable components keeping in dust and sludge of steel-smelting furnaces.